

# Update on L00 parametric CDM

The Helsinki Group

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July 14th 2005

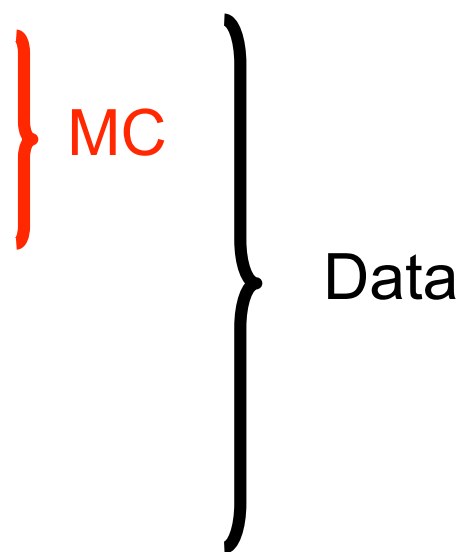
# Status

- Qualitative agreements obtained for SVX and L00 between data and PCDM
- New features in L00 implemented:
  - reversed readout
  - magnetic field
  - sensor type
- One remaining discrepancy in L00 unbiased corrected residuals

# Models

- Simulate the charge deposition and drift in L00, SVX and ISL
- **GEOMETRIC** model: is basic geometric description of the silicon system
- **PARAMETRIZED** model:
  - includes delta rays, charge diffusion in magnetic field, noise, capacitive coupling
  - Can be TUNED to describe real data

# Data sample and cuts

- SiHitAnalyzer code in release 6.1.0
  - Compare 'fake track' simulation with  $J/\Psi \rightarrow \mu \mu$  data (xpmm0d)
  - Track selections adapted from Sebastian:
  - COT: > 10 axial and stereo hits, > 20 total hits
  - $|\eta| < 1$
  - $0.5 < p_T < 1.5 \text{ GeV}$
  - $|D_{\text{new}}| = |d_0 - y_{\text{Beam}} \cos(\phi_0) + x_{\text{Beam}} \sin(\phi_0)| < 0.1 \text{ cm}$
  - $|z_0| < 60. \text{ cm}$
  - Fiducial:  $|\phi_{\text{loc}}| < 0.25 \text{ rad}$ ,  $|z_{\text{loc}}| < 6.0 \text{ cm}$
  - Track passes no overlap region
- 

—— Changed wrt last time

# Current tuning parameters

Phi-Side						
	L00	L1	L2	L3	L4	L5
Cross-talk	0.2	0.46	0.47	0.48	0.42	0.46
	0.1	0.46	0.47	0.49	0.39	0.47
Gain	2.1	2.1	2.1	1.9	2.1	1.9
	2.17	2.1	2.2	1.8	2.1	1.9
Offset	-13	-13	-12	-12	-13	-11
	-13	-10	-12	-11	-14	-11

— Old Helsinki 
 — Latest Helsinki 
 — Repository

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# Current tuning parameters

Z-Side						
	L00	L1	L2	L3	L4	L5
Cross-talk	--	0.16 0.09 0.20	0.17 0.10 0.19	0.51 0.56 0.51	0.22 0.22 0.24	0.50 0.55 0.50
Gain	--	1.7 1.8 1.7	1.7 1.8 1.7	2.2 2.2 2.2	1.7 1.7 1.7	2.2 2.2 2.2
Offset	--	-14 -14 -16	-14 -14 -16	-14 -13 -15	-14 -14 -16	-14 -15 -15

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# Results

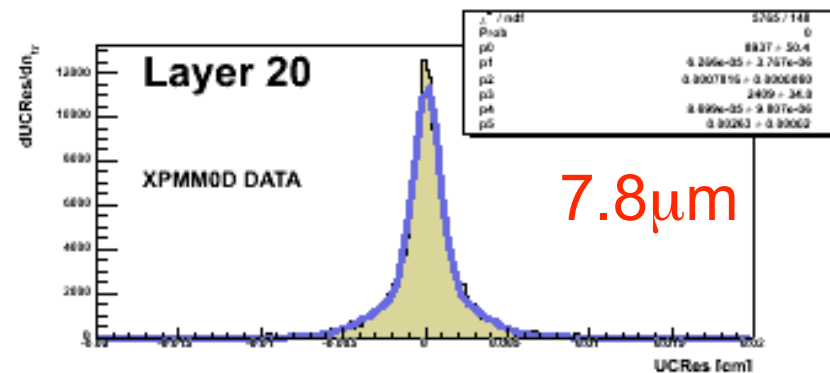
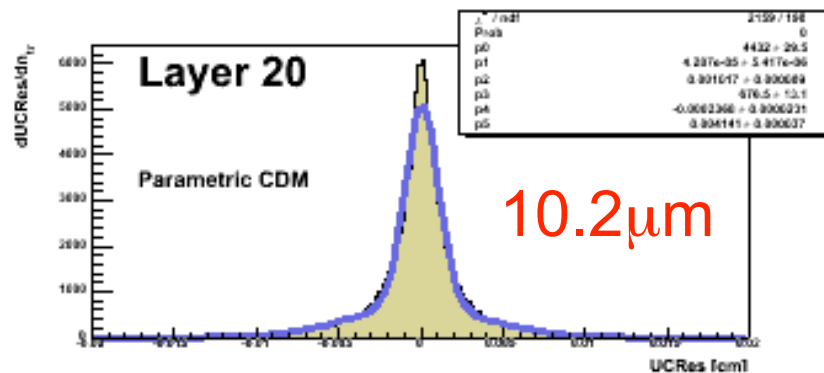
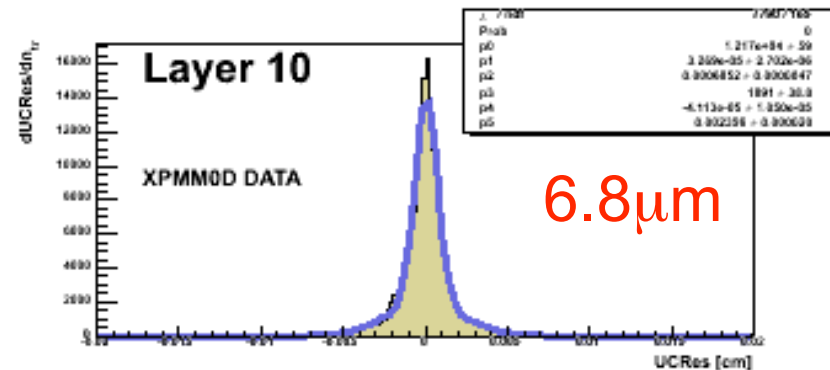
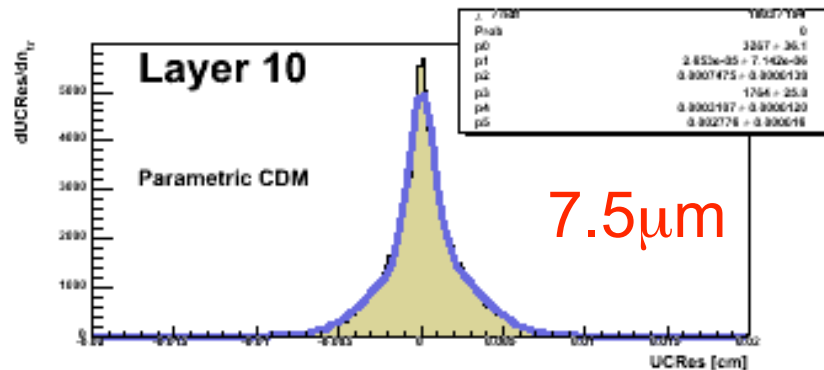
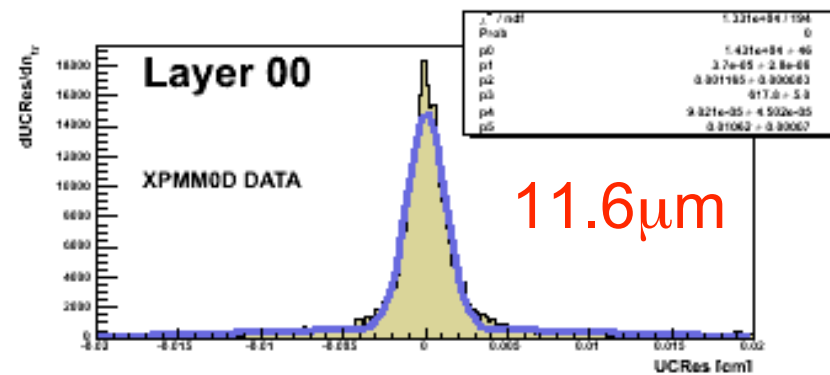
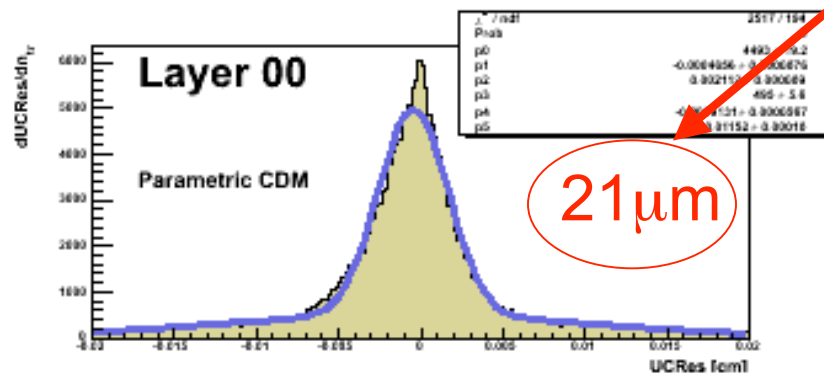
- Tuning of 3 parameters(gain, offset and cross-talk) is generally done on 3-4 distributions: Strip multiplicity, charge distribution, hit residual, **average noise**
- Are on the web: [home.fnal.gov/~remortel](http://home.fnal.gov/~remortel)
- Will be updated regularly
- Will be quantified ( $\chi^2$ )

# Phi-side Residuals

SIMULATION

TOO LARGE!

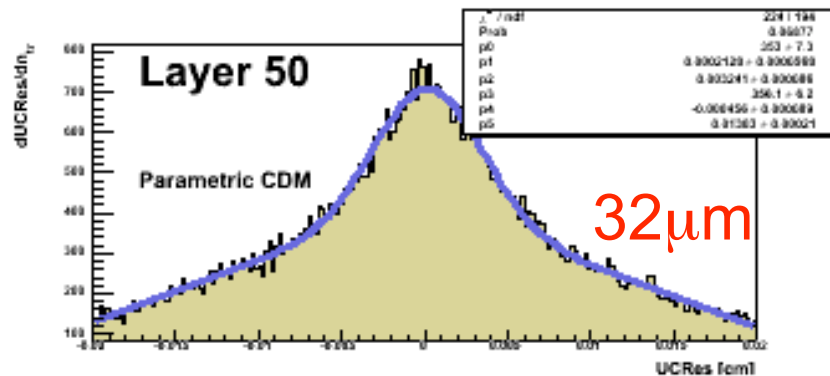
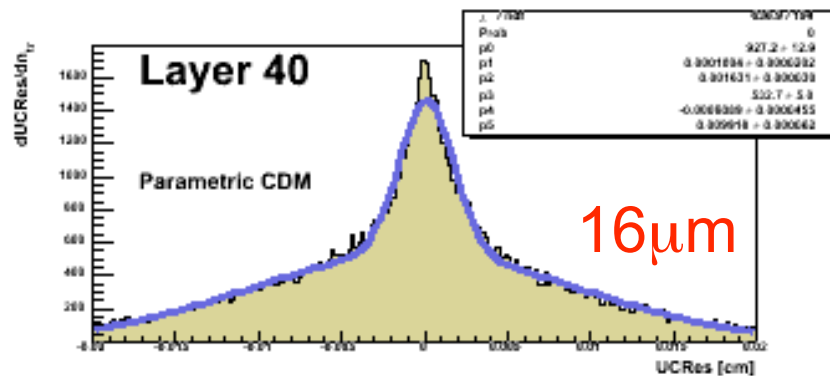
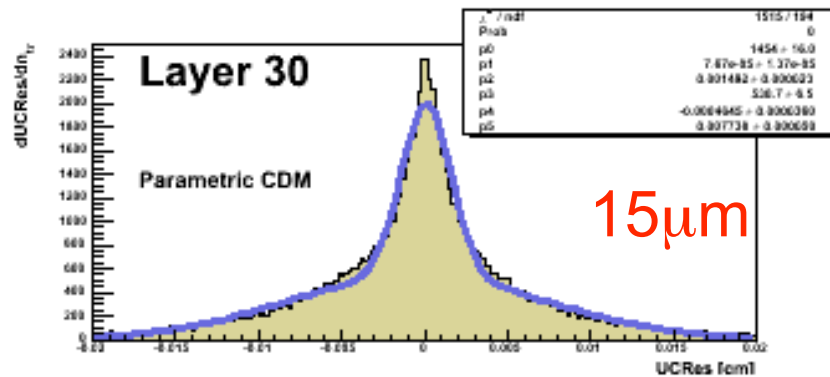
DATA



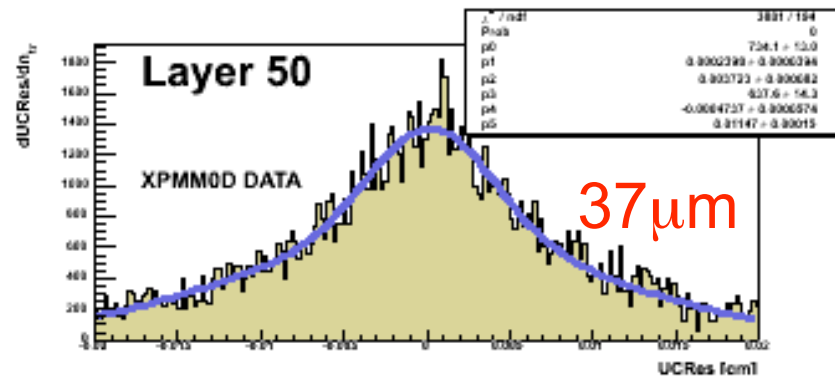
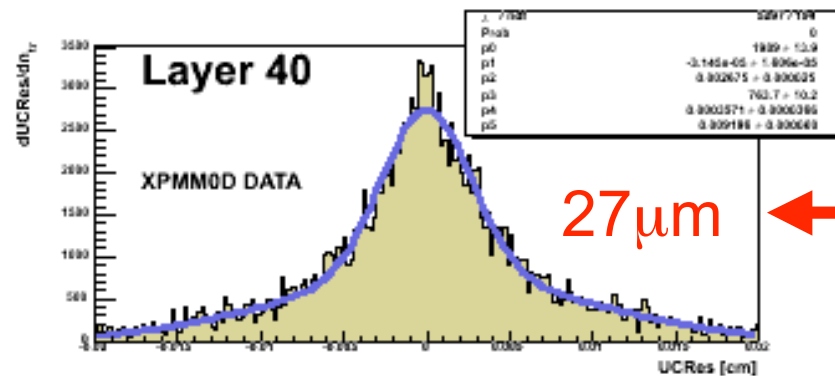
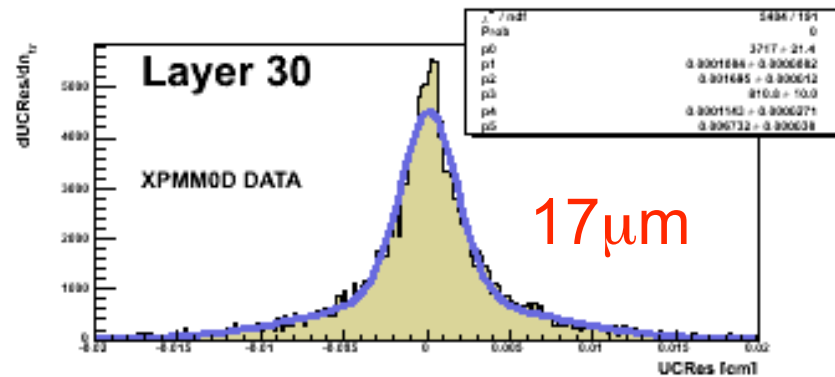


# Phi-side Residuals

**SIMULATION**

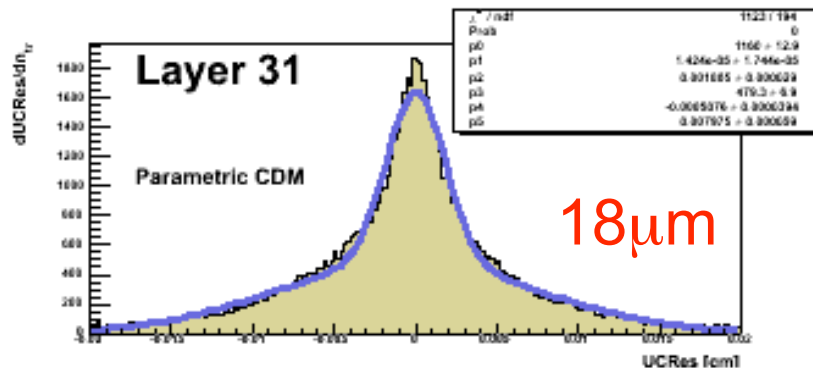
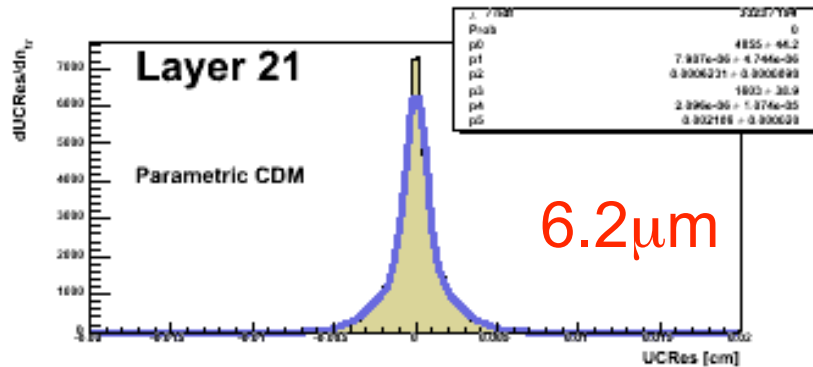
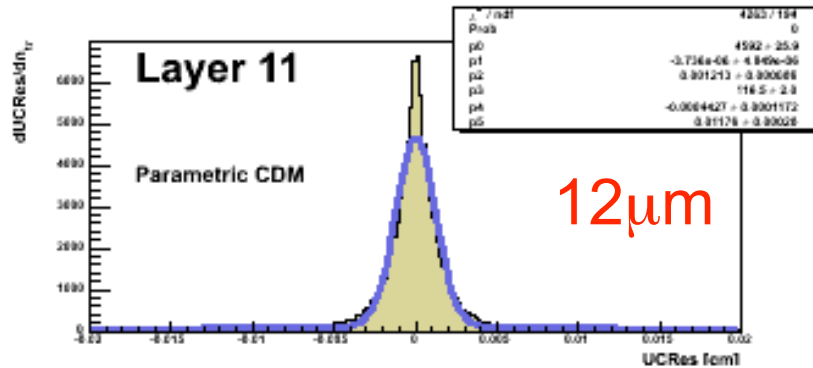


**DATA**

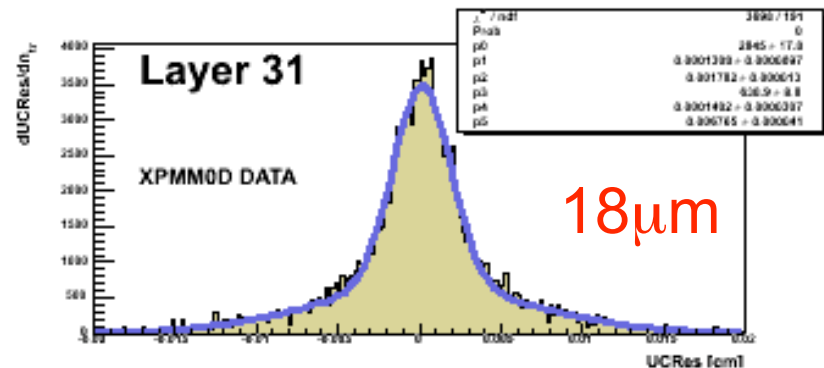
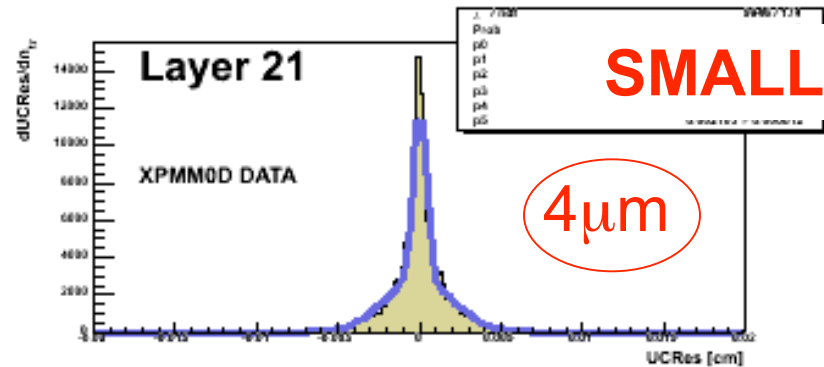
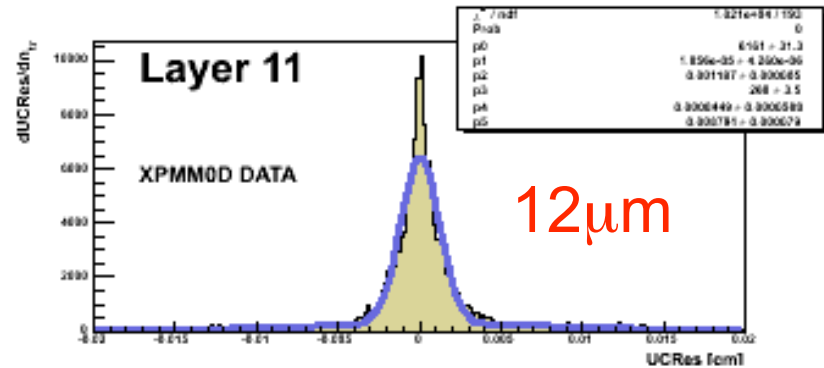


# Z-side Residuals

## SIMULATION

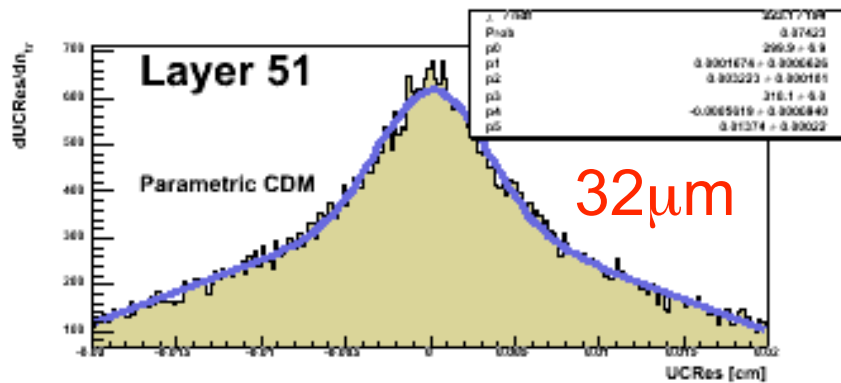
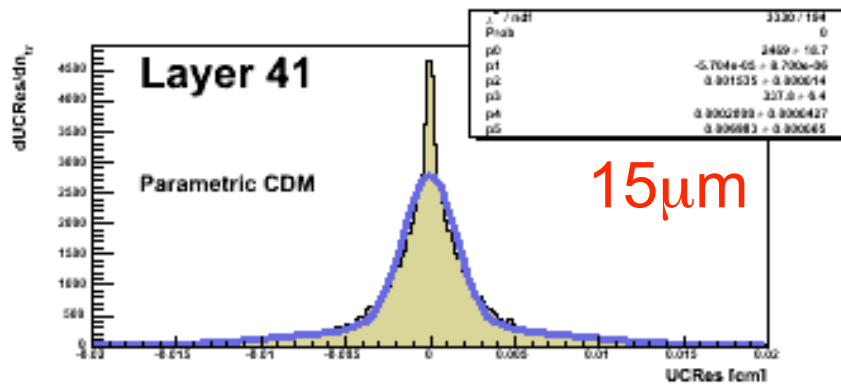


## DATA

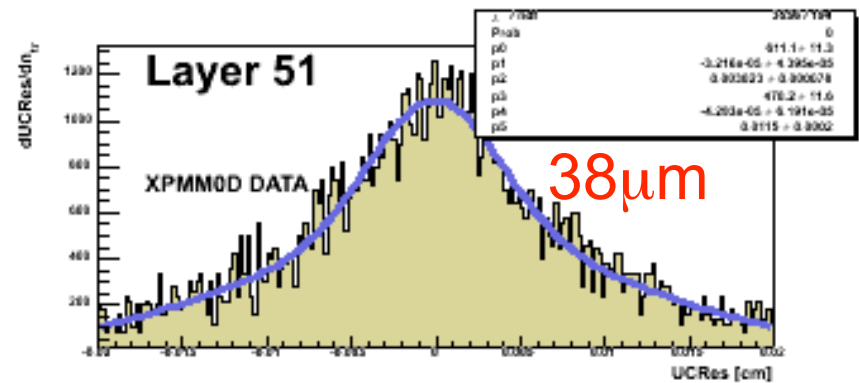
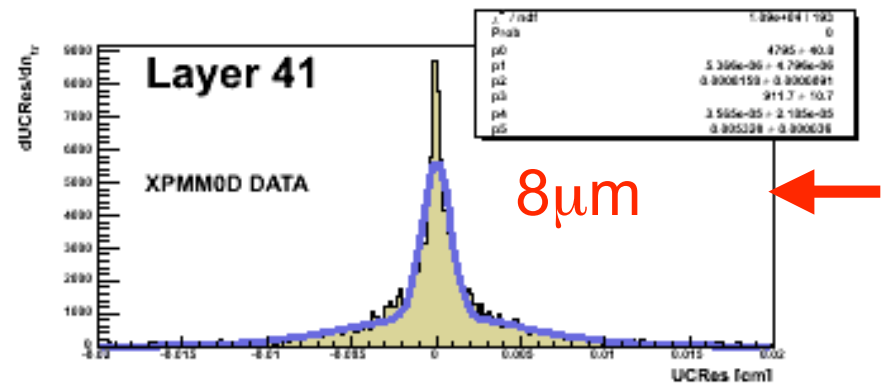


# Z-side Residuals

**SIMULATION**



**DATA**



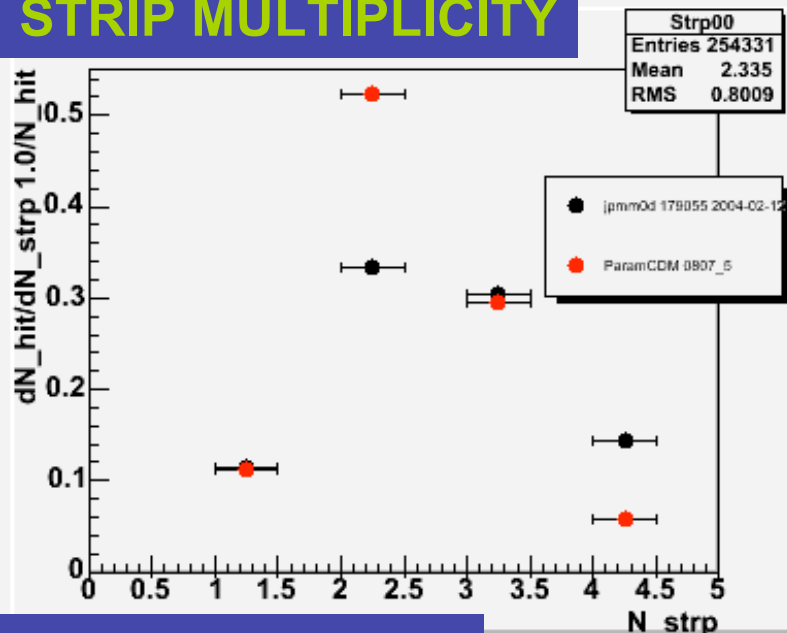
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# Layer 00

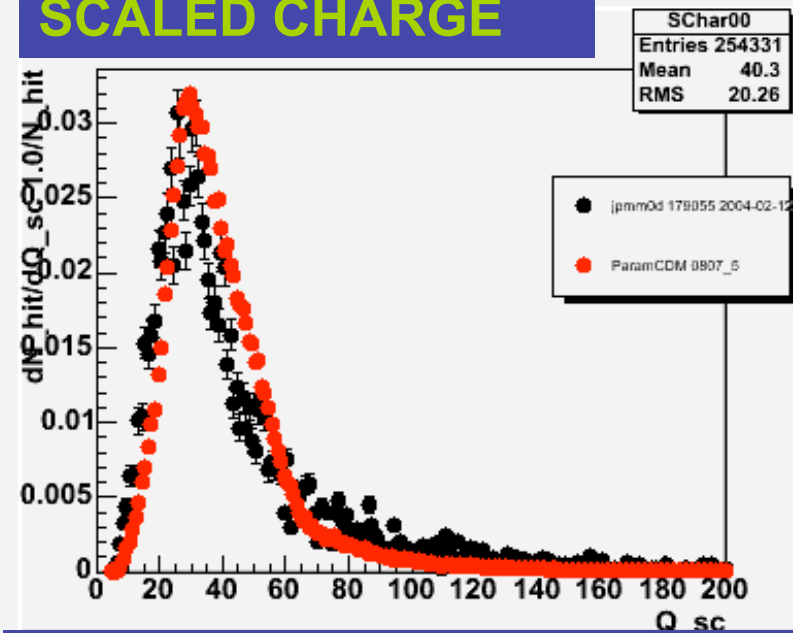
- Parametrized CDM was not implemented for L00
- Should be ported from SVX
- Looking into the code, parametrized CDM for L00 can be switched on and gives good description of the data!
- New features now implemented: sensor type, reverse readout, magnetic field, strip pitch
- Comparison with data looks good, only the hit resolution is a factor 2 off! (see earlier transparencies)

# Layer 00 continued

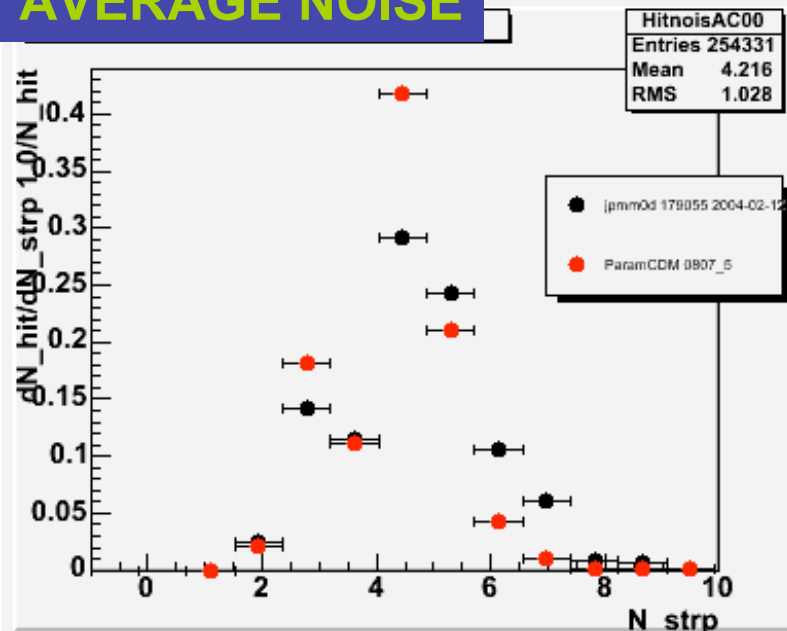
## STRIP MULTIPLICITY



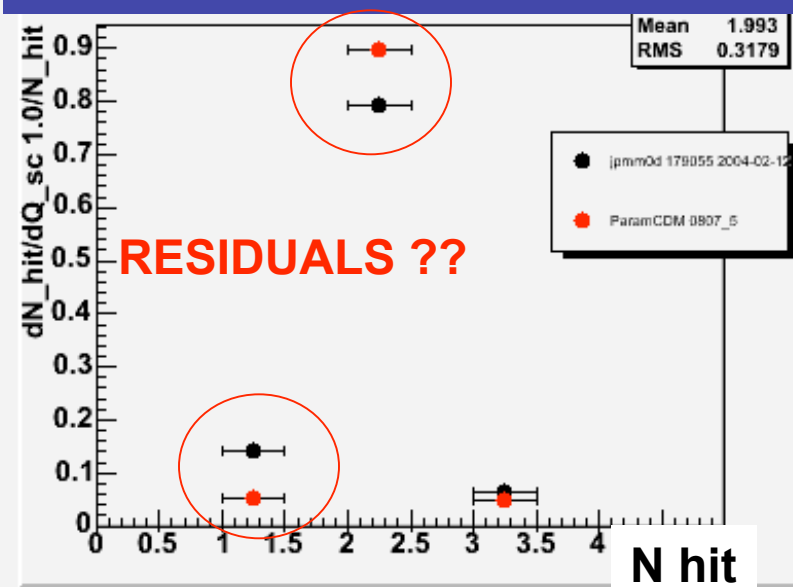
## SCALED CHARGE



## AVERAGE NOISE



## HITS ASSOCIATED WITH TRACK



# Conclusion

- We're getting close to a full tuning of SVX and L00
- Resolutions need to be understood and discrepancy in L00 solved
- Check our webpage ([home.fnal.gov/~remortel](http://home.fnal.gov/~remortel)) and comment!

# Plans

- Make tuning quantitative! Minimum  $\chi^2$  .
- Continue to investigate L00 Parametric CDM
- Resolutions as function of strip multiplicity, phi, pt, etc ...
- Look at other data (different momentum spectra)